

## PATENT COOPERATION TREATY

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## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference Cal 88535	<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/EP2004/010169	International filing date (day/month/year) 09.09.2004	Priority date (day/month/year) 11.09.2003	
International Patent Classification (IPC) or national classification and IPC INV. C01B3/38			
Applicant ENI S.P.A. et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 2 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand  07.04.2005		Date of completion of this report  03.03.2006	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized officer  Zalm, W  Telephone No. +31 70 340-2804 	

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**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/EP2004/010169

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

**Description, Pages**

1-19 as originally filed

**Claims, Numbers**

1-7 received on 05.07.2005 with letter of 05.07.2005

**Drawings, Sheets**

1/2, 2/2 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1-7
	No: Claims	
Inventive step (IS)	Yes: Claims	1-7
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

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**Box No. VIII Certain observations on the international application**

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The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**Re item V:**

(i) Reference is made to the following documents:

D1: WO-A-0000426

D2: US-A-4394137

(ii) The present application does meet the criteria of Article 33(1) PCT.

Document D1 (discussed on page 6 of the description of the application) discloses a CPO-process wherein the feedstock can be gaseous (e.g. C1-5-hydrocarbons) or liquid (e.g. C>5-hydrocarbons), see the claims and description page 6, line 28 - page 8, line 2. More in particular (see page 7, lines 19-24) it is also possible to use a gaseous feedstock together with a material which is liquid.

Independent process **claim 1** of the present application differs from this prior art in that the liquid fuel used is a low quality gas oil which contains a high content of aromatics and sulphur. The subject-matter of this claim is thus new.

The problem solved by the alleged process can be regarded the use of sulfur-containing fuels from which it can be expected that they will have a deactivating effect on the catalysts present in the reactor.

D1 does not specify a sulfur content of the fuels. Moreover, the specification of the feedstocks indicates that only pure sources are used for partial oxidation (see page 6, line 28 - page 7, line 18). It thus appears that the sulfur-containing sources like defined in claim 1 of the present application can be used as sources is surprising and consequently contributes to the presence of an inventive step.

Claims 2-7 are allowable as preferred embodiments of the independent claim 1 to which they refer.

**Re item VIII:**

The application does not meet the requirements of Article 6 PCT because **claims 1-7** are not clear.

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(SEPARATE SHEET)**

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The description is not adapted to the amended claims, which leads to confusion and doubt about the scope of the claims.

CLAIMS

1. A process for the catalytic partial oxidation of liquid fuels, selected from ~~hydrocarbon and/or oxygenated compounds~~ low quality gas oils with a high content of aromatics and sulphur, together with gaseous fuels, selected from ~~hydrocarbon compounds~~, refinery gases, natural gas, and/or LPG, by means of a suitable catalytic system comprising the following steps:

- premixing and optionally heating to temperatures ranging from 25 to 400°C, the reagents consisting of said liquid hydrocarbons, said gaseous hydrocarbons and oxygen or air or oxygen enriched air, optionally in the presence of vapour and/or CO<sub>2</sub>;

- reacting the mixture of reagents in the catalytic zone, at inlet temperatures ranging from 50 to 500°C and space velocities ranging from 1000 to 1,000,000 NL reagents/L cat x h, reaching temperatures at the outlet of the catalytic bed ranging from 450 to 1350°C.

2. The process according to claim 1, wherein, heavy residues from oil distillation are also present among the reagents.

3. The process according to claim 2, wherein the heavy residues from oil distillation are mixed with the reagents after being fluidized by means of thermal treatment or by dilution with suitable gas oils.

4. The process according to claim 1, wherein the catalytic system consists of oxides, oxynitrides, nitrides, carbides and/or oxycarbides containing one or more elements selected from Rh, Ru, Ir, Pt, Ni, Fe, Co and Mo.
5. The process according to claim 1, wherein, among the reagents, the ratio between vapour moles/moles of hydrocarbon carbon atoms ~~(vapour/C)~~ at the inlet of the catalytic zone ranges from 0 to 2 and the ratio between oxygen moles/moles of hydrocarbon carbon atoms ~~(O<sub>2</sub>/C)~~ ranges from 0.1 to 0.8.
6. The process according to claim 1, wherein, among the reagents, the ratio between vapour moles/moles of hydrocarbon carbon atoms ~~(vapour/C)~~ at the inlet of the catalytic zone ranges from 0.1 to 1 and the ratio between oxygen moles/moles of hydrocarbon carbon atoms ~~(O<sub>2</sub>/C)~~ ranges from 0.25 to 0.75.
7. The process according to claim 1, wherein low-quality gas oils with a high content of aromatics are selected from Light Cycle Oils (LCO) and Heavy Cycle Oils (HCO).